Form ESA-B4. Public Report for ESA-062-3
Final

Company	Kapstone Kraft Corporation	**ESA Dates**	April 12 – 15, 2008
Plant	Roanoke Rapids	**ESA Type**	Process Heating
Product	Kraft Paper	**ESA Specialist**	Ed Hardison

Brief Narrative Summary Report for the Energy Savings Assessment:

Introduction: An ESA was conducted at the Kapstone Kraft Corporation plant in Roanoke Rapids, North Carolina, April 12th – 15th, 2008. This plant is a fully integrated pulp and paper mill which produces unbleached Kraft paper and liner.

Objective of ESA:
1. Introduce the DOE Save Energy Now program and resources available through DOE
2. Provide training on DOE Process Heating Assessment Survey Tool (PHAST)
3. Conduct an energy assessment of selected process heaters
4. Brainstorm potential energy savings opportunities and calculate estimated savings with PHAST

Focus of Assessment: Lime Kiln

Approach for ESA: Review plant equipment and processes, Identify target, define data collection strategy and collect data relative to energy use and losses, input data into PHAST software, review data for potential energy savings opportunities, modify conditions based on plant personnel input, identify savings associated with modifications, discuss opportunities and report

General Observations of Potential Opportunities:
The plant utilizes a #6 oil fired lime kiln to calcine lime mud (CaCO3) and convert it back into lime (CaO) releasing carbon dioxide in the process. The thickened lime mud (at 75% solids) is fed into the high, "cold end" of the rotary kiln. The combustion gases are in direct contact with the lime mud but flow counter to the mud flow. The dissociation of the calcium carbonate into lime and carbon dioxide occurs at the low end of the kiln, once the mud is heated to approximately 2,000°F, which is sufficient to yield a product that is 90-94% CaO. The rejuvenated lime is reused in the process to convert green liquor to white liquor which is suitable for recovery and use in the digesters.

The lime kiln is operated very efficiently but there are a couple of potential savings opportunities:

Use exhaust gas heat for combustion air preheating – Gases leave the kiln exhaust stack at 530°F. If part of this heat is recovered to preheat the kiln combustion air to 200°F, PHAST calculates a potential savings of 11,304 MMBtu/yr. An alternative to using the exhaust air would be to route the combustion air so it flows over part of the exterior wall of the kiln.

Build a structure over the kiln to retain some of the heat lost through the wall – Building a structure over the kiln would help retain some of the heat lost through the wall and dissipated to the environment around the surface of the kiln. This would have the effect of raising the ambient temperature around the kiln and reducing the heat lost through the kiln wall. Assuming the effective ambient temperature could be raised to 150°F, PHAST estimates an energy savings of 13,719 MMBtu/yr. Note that special considerations must be provided for maintenance access to the kiln.

Both of these opportunities are medium term opportunities. Both of the opportunities would require further engineering and return on investment analysis followed by additional equipment purchase and installation. The kiln structure would also require an analysis of the issues associated with maintaining the kiln in a raised ambient temperature environment. Near, medium and long term opportunities are defined as follows:

- Near term opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- Medium term opportunities would require purchase of additional equipment and/or changes in the system such as addition of recuperative air preheaters and use of energy to substitute current practices of steam use etc. It would be necessary to carryout further engineering and return on investment analysis.
- Long term opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

These opportunities would result in a 2.6% savings of the total fuel cost expenditure and 0.8% savings of the fuel energy use. The coal costs and consumption are included in the total plant cost and consumption data. Consequently, the cost savings percentage is higher than the energy savings percentage because the savings opportunities are in equipment using fuel oil which is more expensive than coal on a per MMBtu basis.

Management Support and Comments: Management very supportive of the effort. Sees the PHAST software as a good tool to estimate potential energy savings and identify projects warranting further investigation.

DOE Contact at Plant/Company: Mark Mitchell, (252) 533-6339, mark.mitchell@Kapstonepaper.com